Market Overview for Opening or Investing in a Restaurant in Detroit, Michigan

Introduction

- A first understanding of the big picture is a must for the budding restauranteur or seasoned investor alike.
- What are the most promising neighborhoods for development regarding unmet demand and competition?
- What are the popular dining establishments in each neighborhood?

Data Acquisition

Data was obtained from the following sources:

- Google Maps of Detroit Neighborhoods for list of neighborhood names and areas.
- List of Detroit Zip Codes and geocoordinates: https://www.public.opendatasoft.com
- Foursquare API Developer Access: https://foursquare.com . For exploring venue data related to dining establishments, their popularity and ranking.
- Detroit Quick Facts for demographic data from the US Census Bureau at www.uscensus.gov

Data Retrieval, Exploration and Wrangling

- Census data downloaded and processed into a pandas DataFrame

Snippet of demographic data frame

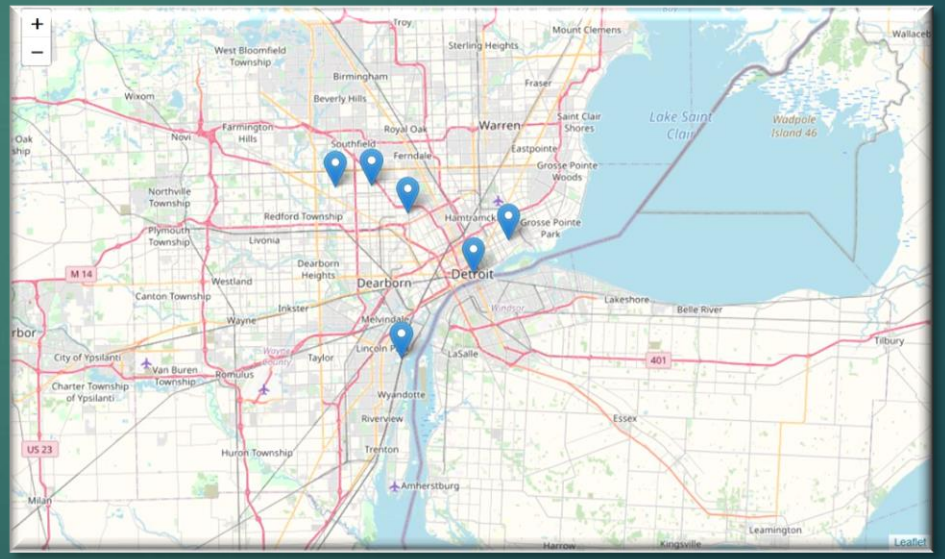
	Fact	Detroit
0	Population estimates, July 1, 2019, (V2019)	670,031
1	Population estimates base, April 1, 2010, (V2...	713,898
2	Population, percent change - April 1, 2010 (es...	-6.1%
3	Population, Census, April 1, 2010	713,777
4	Persons under 5 years, percent	7.3%

Geocoordinate Data

Geocoordinate and Zip Codes

	Zip Code	Latitude	Longitude
0	48238	42.396736	-83.141520
1	48297	42.239933	-83.150823
2	48269	42.239933	-83.150823
3	48258	42.239933	-83.150823
4	48272	42.239933	-83.150823
5	48214	42.368137	-82.993140
6	48219	42.425236	-83.249020
7	48267	42.239933	-83.150823
8	48235	42.427636	-83.195470
9	48266	42.239933	-83.150823
11	48201	42.331429	-83.045753

Map of geocoordinate data and Zip Codes

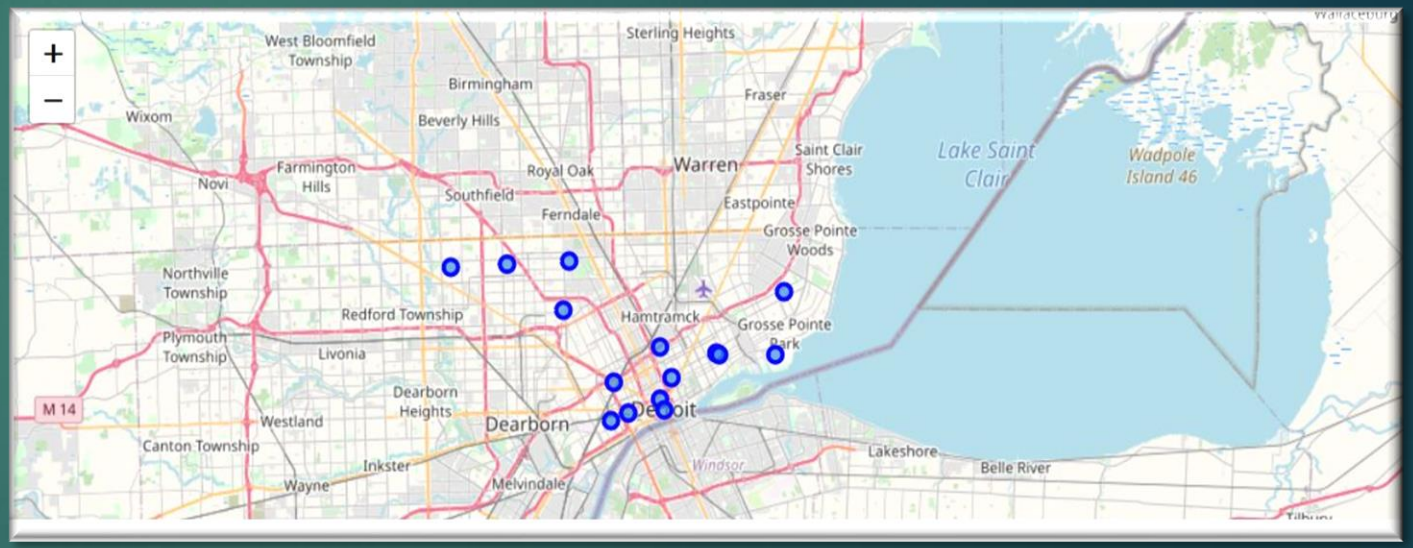


Additional geocoordinate and neighborhood data obtained from Google Map search, merged with previous data and mapped using Folium.

- Data Frame

	Zip Code	Neighborhood	Latitude	Longitude
0	48209	Mexicantown	42.324493	-83.096043
1	48201	Corktown	42.329569	-83.079564
2	48208	Core City	42.349617	-83.093983
3	48226	Downtown Detroit	42.338199	-83.049694
4	48207	Eastern Market	42.352155	-83.039051
5	48211	Poletown	42.372449	-83.049351
6	48214	Indian Village	42.368391	-82.995793
7	48215	Jefferson Chalmers	42.368137	-82.939488
8	48224	East English Village	42.408963	-82.931591
9	48221	University District	42.429746	-83.136212

- Merged map of points



Exploring with Fouresquare

Counts of Venues

Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
City	141	141	141	141	141	141
Core City	19	19	19	19	19	19
Corktown	52	52	52	52	52	52
Downtown Detroit	100	100	100	100	100	100
East English Village	32	32	32	32	32	32
Eastern Market	64	64	64	64	64	64
Indian Village	6	6	6	6	6	6
Jefferson Chalmers	19	19	19	19	19	19
Mexicantown	35	35	35	35	35	35
Poletown	11	11	11	11	11	11

Snippet of Venues from Foursquare

	Neighborhood	Neighborhood Latitude	Neighborhood Longitude	Venue	Venue Latitude	Venue Longitude	Venue Category
0	Mexicantown	42.324493	-83.096043	El Club	42.321434	-83.093511	Music Venue
1	Mexicantown	42.324493	-83.096043	Mexicantown Bakery	42.320815	-83.094930	Bakery
2	Mexicantown	42.324493	-83.096043	Taqueria El Rey	42.319166	-83.098925	Mexican Restaurant
3	Mexicantown	42.324493	-83.096043	Flowers Of Vietnam	42.320109	-83.096501	Vietnamese Restaurant
4	Mexicantown	42.324493	-83.096043	La Jalisciense Taqueria	42.321991	-83.091155	Taco Place

Analyzing Neighborhoods and Venues

- Variables transformed using one-hot-encoding
- The Top ten Venues were then sorted into a pandas DataFrame
- Venues visualized with a scatterplot
- K-Means clustering performed for segmentation

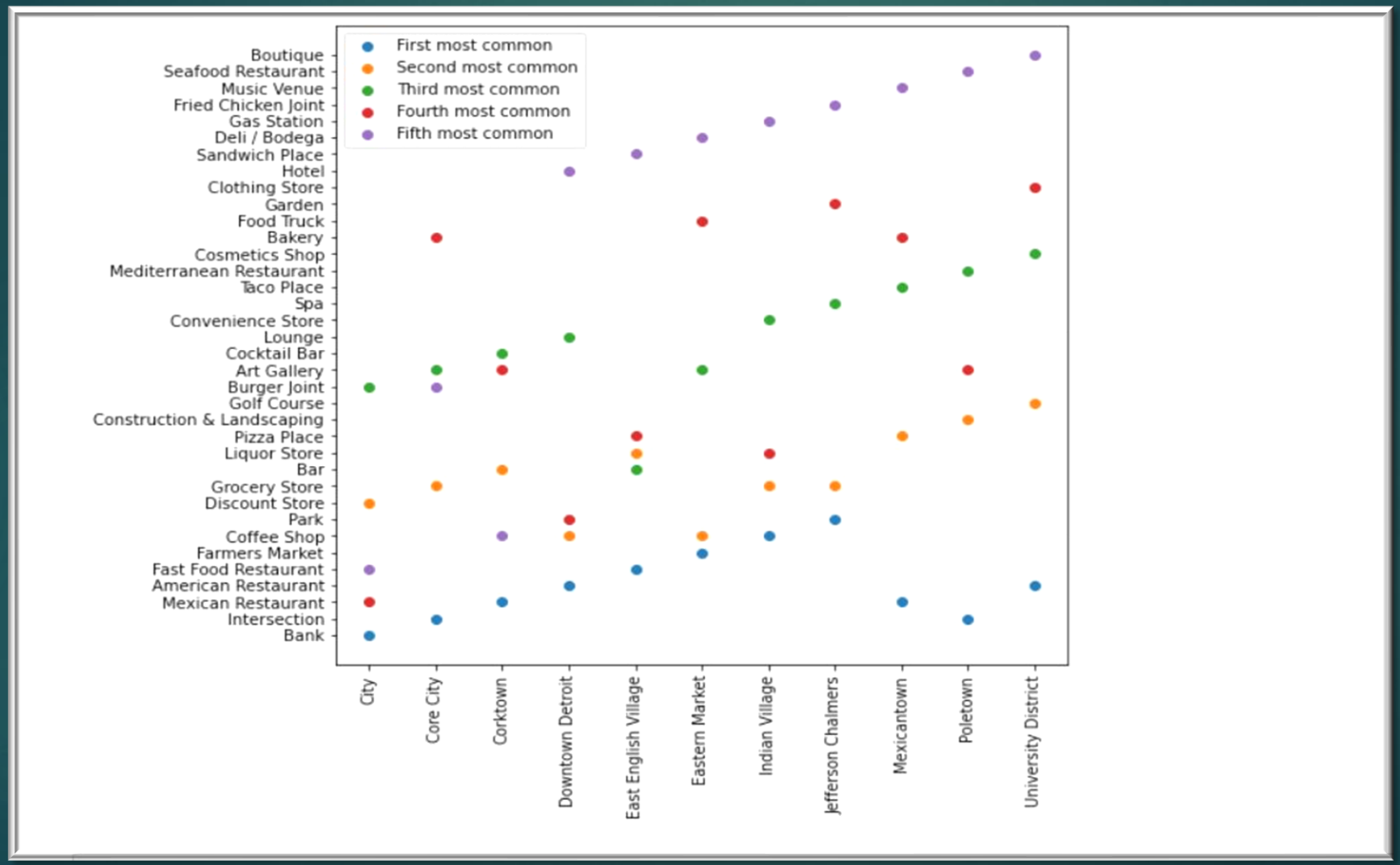
One-Hot Encoded Venues

	Neighborhood	Accessories Store	American Restaurant	Antique Shop	Art Gallery	Asian Restaurant	Athletics & Sports	Auto Workshop	Automotive Shop	BBQ Joint	Bakery	Bank	Bar	Baseball Stadium	B Brea
0	City	0.0	0.014184	0.000000	0.014184	0.007092	0.000000	0.000000	0.000000	0.000000	0.000000	0.06383	0.021277	0.007092	0.0
1	Core City	0.0	0.000000	0.052632	0.105263	0.000000	0.000000	0.052632	0.000000	0.000000	0.105263	0.00000	0.000000	0.000000	0.0
2	Corktown	0.0	0.000000	0.019231	0.038462	0.019231	0.019231	0.000000	0.019231	0.019231	0.038462	0.00000	0.076923	0.000000	0.0
3	Downtown Detroit	0.0	0.060000	0.000000	0.010000	0.000000	0.000000	0.000000	0.000000	0.010000	0.000000	0.01000	0.040000	0.010000	0.0
4	East English Village	0.0	0.031250	0.000000	0.000000	0.000000	0.031250	0.000000	0.000000	0.031250	0.000000	0.00000	0.093750	0.000000	0.0

Top ten venues sorted

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	City	Bank	Discount Store	Burger Joint	Mexican Restaurant	Fast Food Restaurant	Pharmacy	Park	Coffee Shop	Hotel	Steakhouse
1	Core City	Intersection	Grocery Store	Art Gallery	Bakery	Burger Joint	Skate Park	Bus Station	Mediterranean Restaurant	Check Cashing Service	Men's Store
2	Corktown	Mexican Restaurant	Bar	Cocktail Bar	Art Gallery	Coffee Shop	Bakery	New American Restaurant	Pub	Historic Site	Sandwich Place
3	Downtown Detroit	American Restaurant	Coffee Shop	Lounge	Park	Hotel	Steakhouse	Bar	New American Restaurant	Dessert Shop	Burger Joint
4	East English Village	Fast Food Restaurant	Liquor Store	Bar	Pizza Place	Sandwich Place	Fried Chicken Joint	Home Service	Fishing Spot	Deli / Bodega	Diner

Scatterplot of the Top Five Venues per Neighborhood

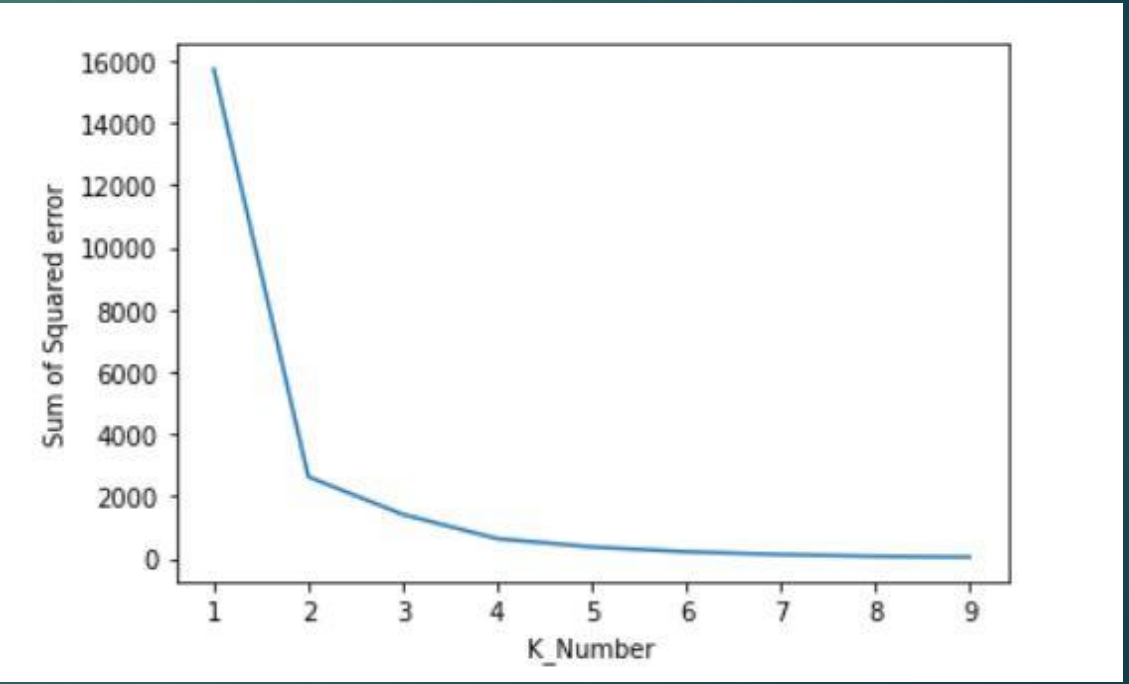


K-Means Clustering
Determining the number of K clusters

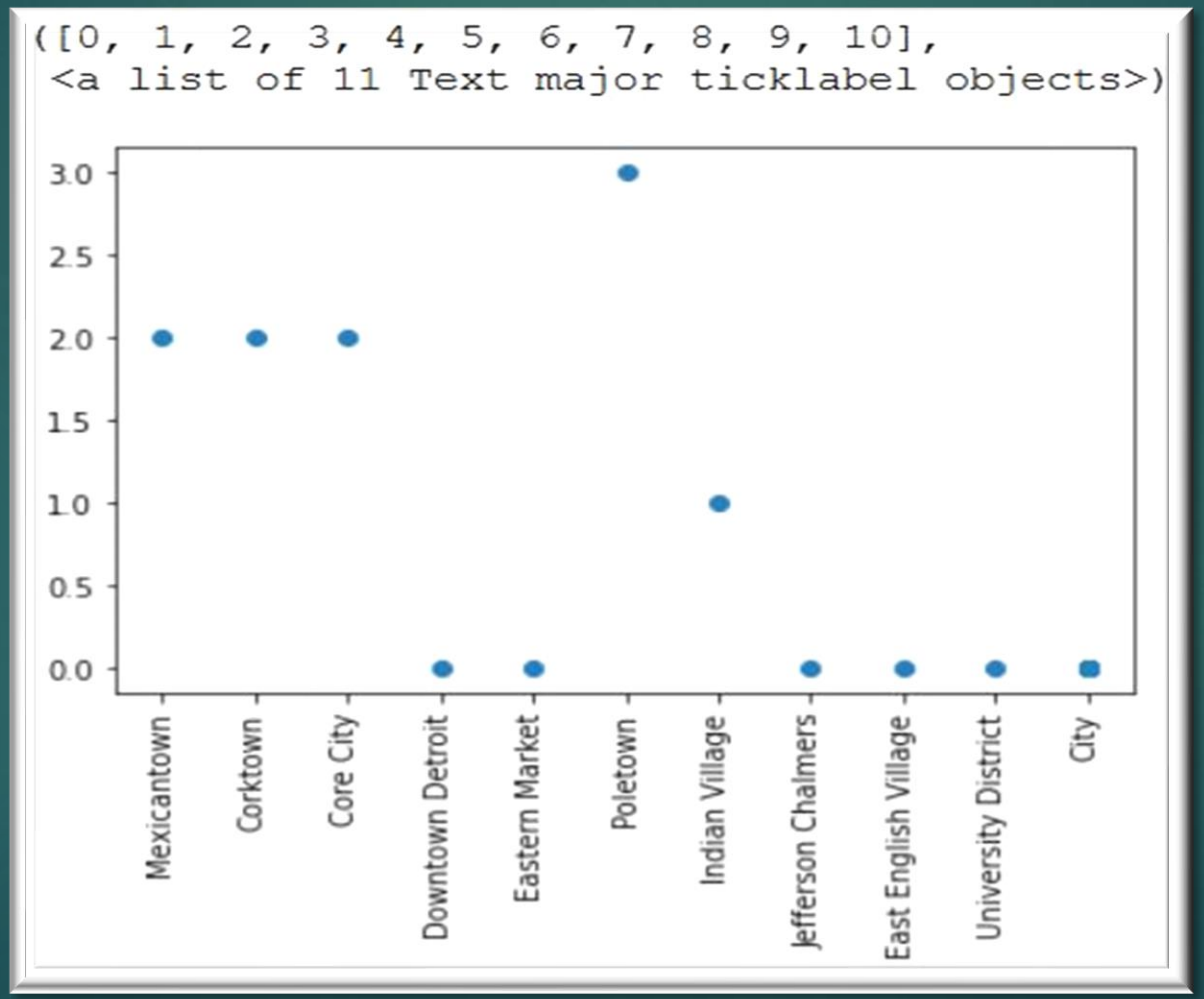
- Calculated Sum of Squared error

```
[15733.238095238099,
 2625.2333333333336,
 1418.1111111111113,
 637.811111111111,
 371.20000000000005,
 216.4142857142857,
 128.21428571428572,
 71.33333333333333,
 46.333333333333333]
```

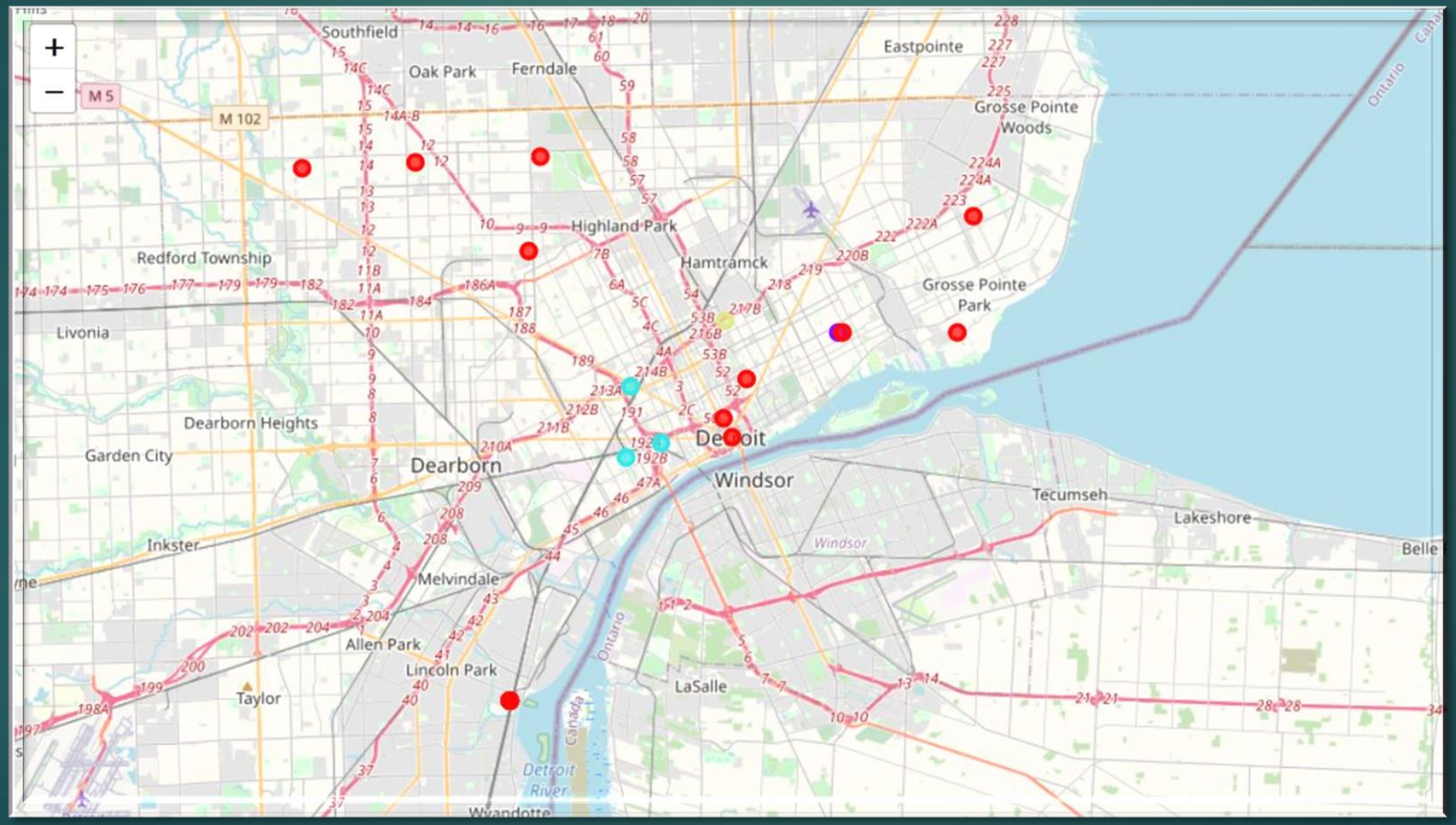
- Elbow Plot



Scatterplot of Four Clusters



Folium Map of the Clustered Venues



Results

- Cluster 0 in red, with the largest number of dining establishments, highlights neighborhoods mainly on the periphery of Detroit with the exception of the Downtown, a designated City area, and the Eastern Market Neighborhood.
- Cluster 1 in purple, highlights the Indian Village neighborhood with sparse dining opportunities.
- Cluster 2 in light blue, highlights the Mexicantown, Corktown and Core City neighborhoods. These neighborhoods have a good number of dining establishments.
- Cluster 3 in light brown, highlights the Poletown neighborhood, having among the fewest dining venues.

Results continued

Listing the top dining establishments for each neighborhood we see:

City – Mexican restaurant, Fast food/burger joint
Core City - Burger Joint
Corktown – Mexican restaurant, Coffee Shop
Downtown Detroit – American restaurant, Coffee shop
East English Village – Fast food, Deli
Indian Village – Coffee shop
Jefferson Chalmers – Fried Chicken Joint
Poletown – Mediterranean restaurant, Seafood restaurant
University District – American restaurant, Burger joint
Mexicantown – Mexican restaurant, mobile food truck

Conclusion

- Used a combination of datasets obtained from or created independently from the US Census Bureau, Foursquare Developer API, public.opendatasoft.com and Google Maps search results.
- Detroit neighborhoods were analyzed for their potential as areas for opening or investing in a restaurant.
- Through a process of statistical description, visualizations and K-Means clustering the most popular types of dining establishments in each neighborhood were determined, and the most promising neighborhoods for development were suggested.